

Light Measurement Report

Print date: 10-2-2025

Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS

Measurement tracking No. and Link: [VT250210-007458](#)

Operator:



Laboratory and Equipment

Laboratory Owner and Location

Goniospectrometer System and Type

Sensor Name, Calibr. Date and Serial No.

Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark

LabSpion – Type C, horizontal

LabSensor Model2 – 11-1-2024 – 3130191315

Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

Measurement Conditions

Number of C-planes and Resolution

γ (gamma)-Resolution

Test Distance

Input Power, Power and Displ. Factors

Input RMS Voltage and Current

Frequency of Input Power

Warm-up Time and Variation

12 planes – 30°

5°

4,24 m

17,5 W – PF 0,93 – DPF 0,96

230 V – 0,082 A

50 Hz

Lamp stabilized in 15 min 1 sec – 2,0%

Tested Light Source

Product Name

Item No. and Manufacturer

Product Description (line 1)

DZ-M150-4000K-18W

DZ-M150-4000K-18W – Dutchfulfillment

LED DOWNLIGHT | RAINBOW | 18/25W | CCT SWITCH

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)

Efficiency

Peak Intensity and Beam Angle

Correlated Color Temperature, Target/Measured

Color Rendering Index

Color Rendering TM30-18

Color Shift, CIE duv and MacAdam Steps

Flicker

1787 lm – 0,31% / 99,69%

102 lm/W

626 cd – 111,4°

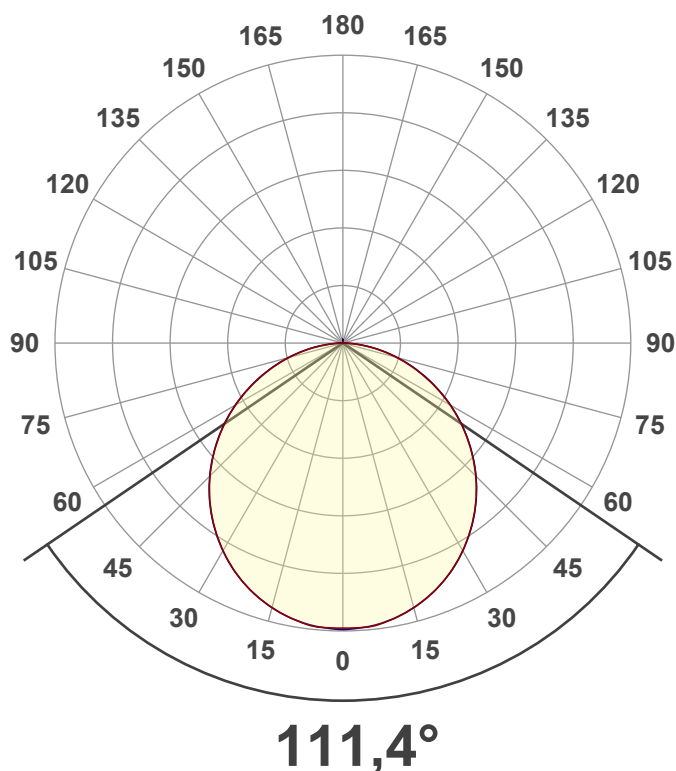
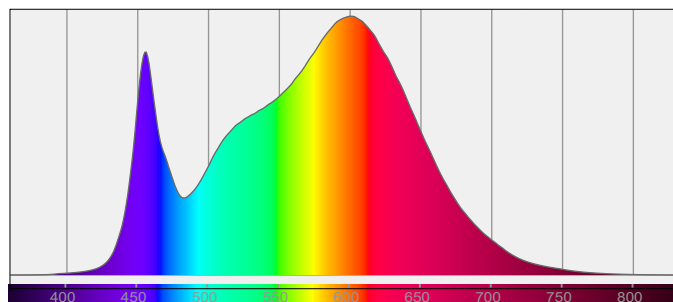
CCT = 4000 K / 3547 K

CRI 85,4

R_f 85,2 – R_g 94,0

Duv -0,0002 – SDCM 11,4

SVM 1,83 – PstLM 0,2



Light Measurement Report

Print date: 10-2-2025

Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS

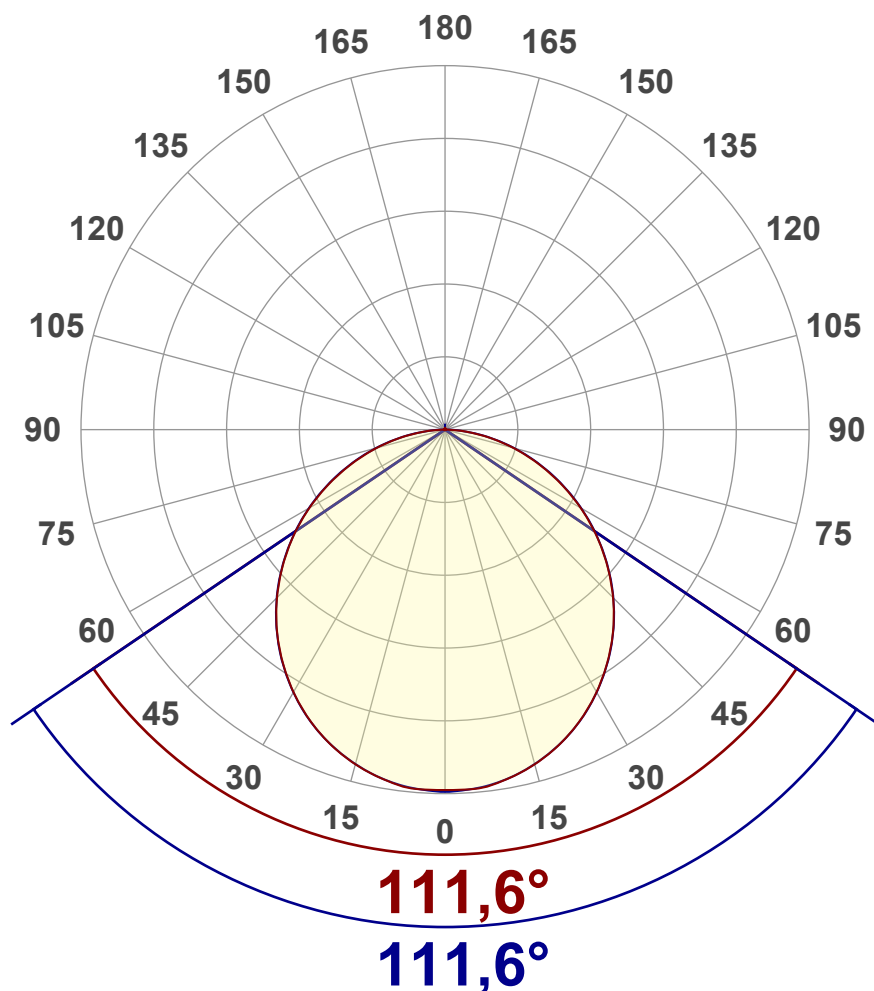
Measurement tracking No. and Link: [VT250210-007458](#)

Operator:



Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1787 lm
Lumen Up% / Down%	0,31% / 99,69%
Peak Intensity	626 cd
Beam Angle (50%)	111,4°
Beam Angle (90%)	111,6°
Beam Angle (10%)	111,6°

Cut-off Angle

Average 2,5%	175,5°
--------------	--------

Field Angle

Average 10%	163,2°
-------------	--------

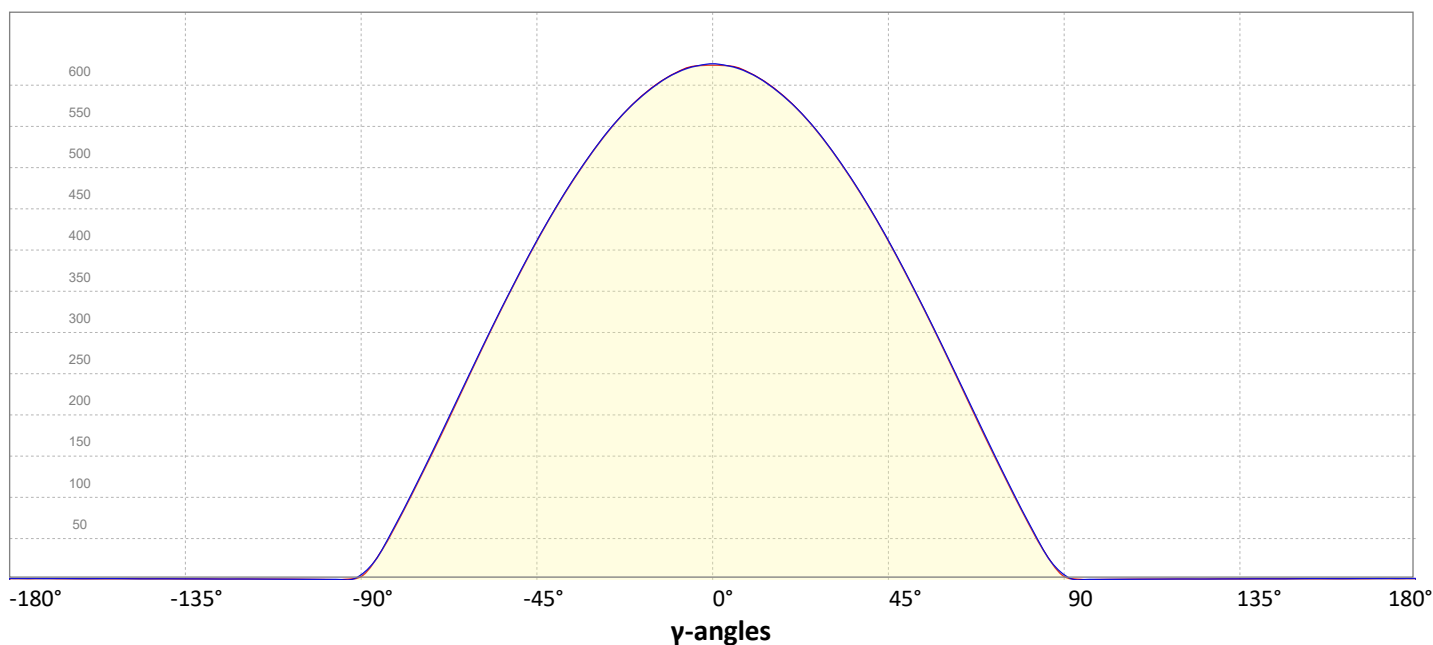
Intensity Ratio

In 120° cone	78,0%
In 90° cone	53,2%

C000-C180

C090-C270

Linear distribution diagram - Intensity (candela) vs γ-angle

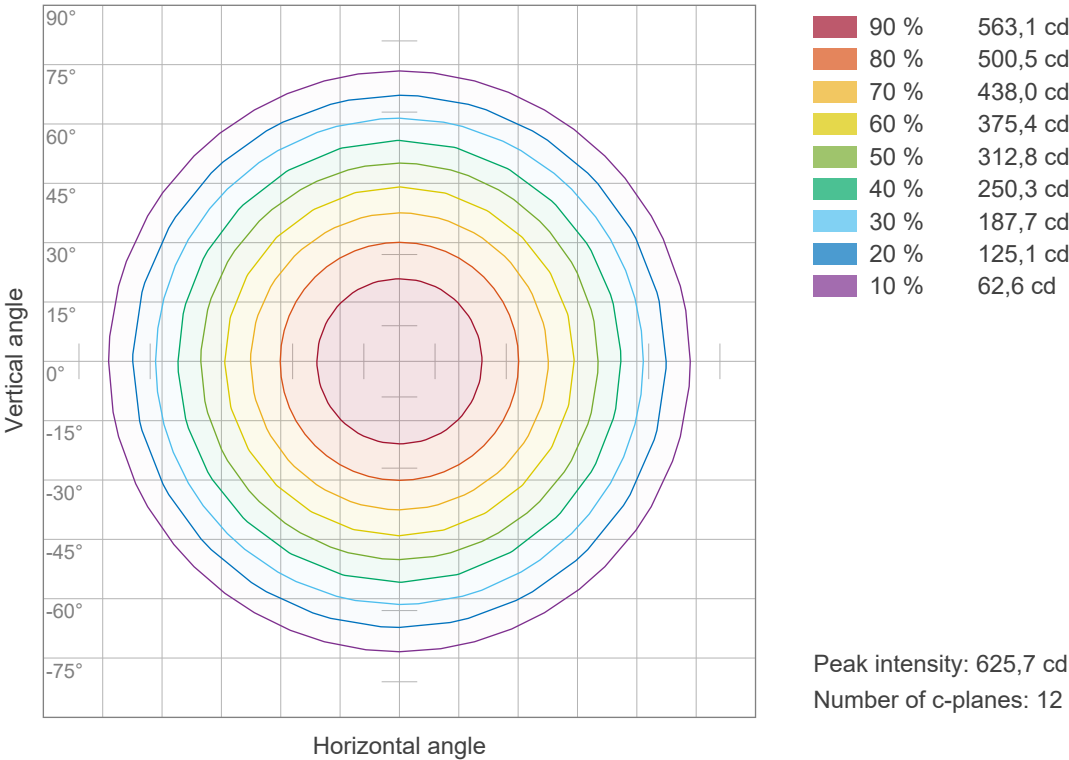


Light Measurement Report

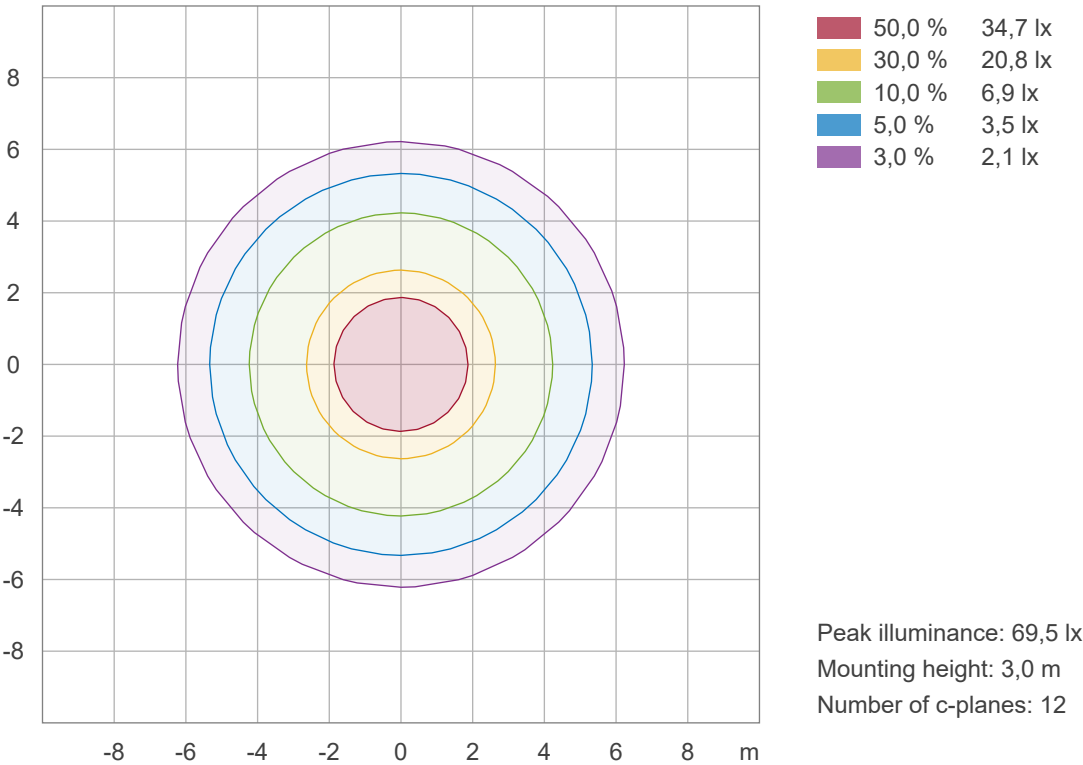
Print date: 10-2-2025
Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS
Measurement tracking No. and Link: [VT250210-007458](#)
Operator:



Iso-intensity Diagram (Iso-candela)



Iso-illuminance Diagram (Iso-lux)



Light Measurement Report

Print date: 10-2-2025

Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS

Measurement tracking No. and Link: [VT250210-007458](#)

Operator:

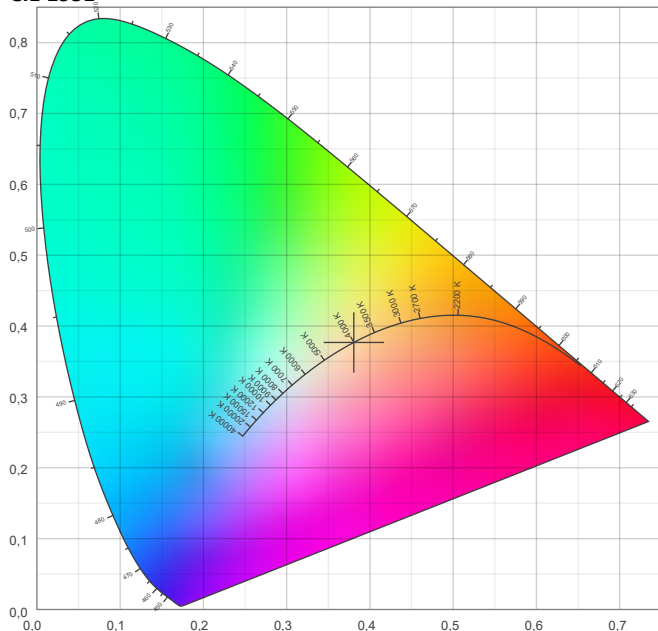


Color details

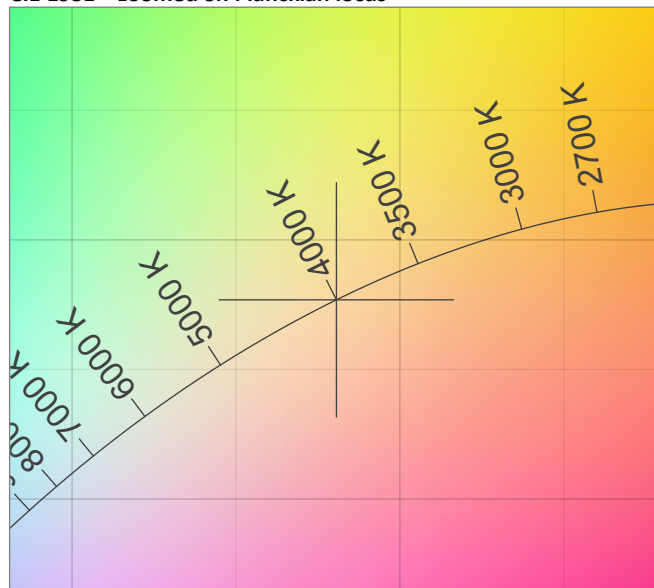
Correlated Color Temperature, Target CCT = 4000 K
Correlated Color Temperature, Measured CCT = 3547 K
Color Rendering Index CRI 85,4
Color Rendering Index, R9 (red component) R9 = 17,0
Color Rendering TM30-18 R_f 85,2 – R_g 94,0
Color Quality Scale CQS = 84,7

MacAdam Steps
Color coordinates CIE 1931 (x;y) = (0,381;0,377)
Color coordinate CIEs 1960 (u;v) = (0,225;0,334)
Color deviation from BBL Duv = -0,0002
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

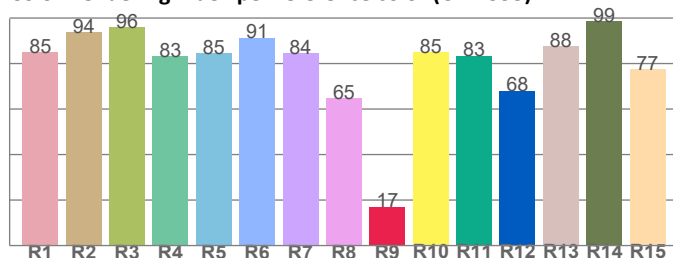
CIE 1931



CIE 1931 – zoomed on Planckian locus



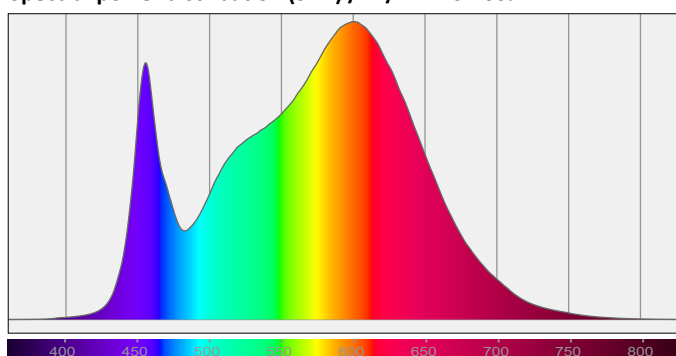
Color Rendering Index per reference color (CIE 1995)



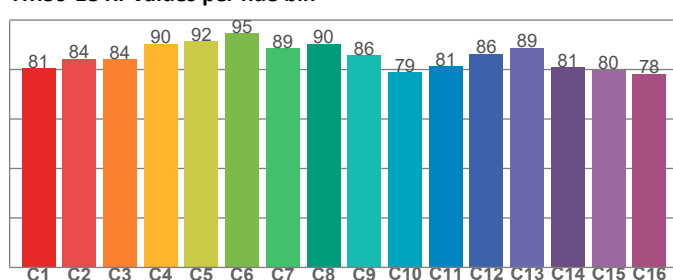
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84,8	93,8	95,8	83,2	84,6	91,4	84,4	64,7	17,0	85,0	83,4	68,0	87,6	98,5	77,4

Spectral power distribution (SPD) / W/nm – 0-100%



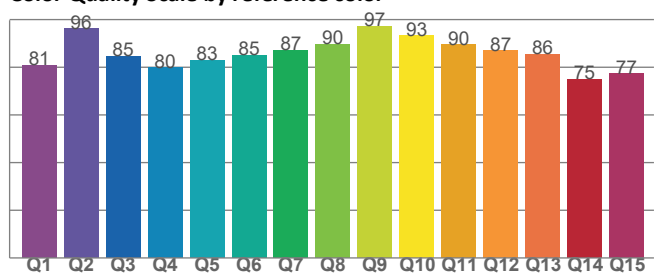
TM30-18 Rf-values per hue bin



TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
80,6	84,3	84,2	90,4	91,5	94,6	88,5	90,4	85,6	78,9	81,4	86,3	88,8	81,0	79,9	78,3

Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
80,8	96,2	84,7	79,8	83,0	85,0	87,2	89,7	97,3	93,2	89,5	87,0	85,6	74,9	77,3

Light Measurement Report

Print date: 10-2-2025

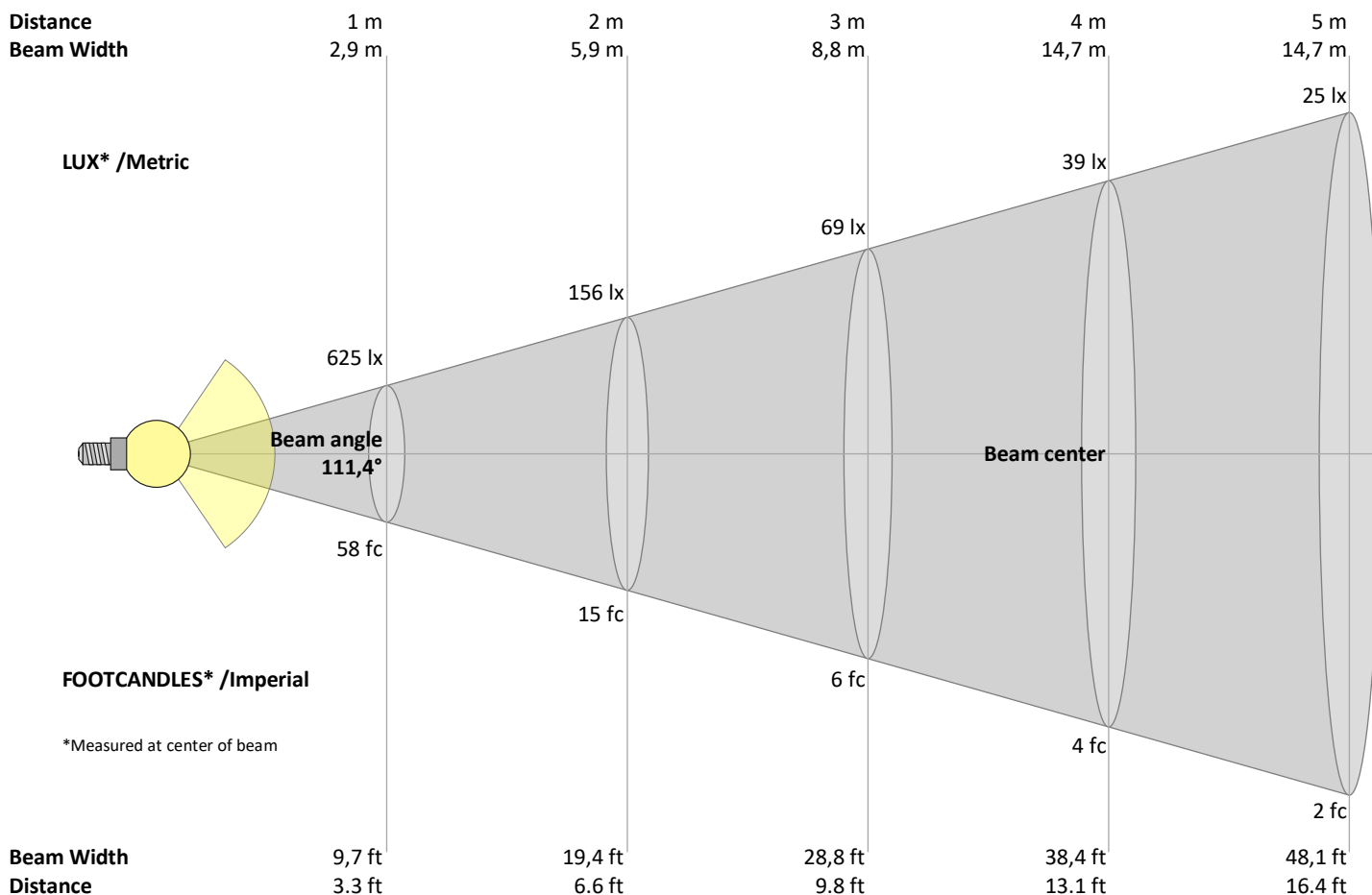
Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS

Measurement tracking No. and Link: [VT250210-007458](#)

Operator:



Beam Details



Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
3,3	6,6	9,8	13,1	16,4	19,7	23	26,2	29,5	32,8	36,1	39,4	42,7	45,9	49,2	52,5	55,8	59,1	62,3	65,6	ft
625	156	69	39	25	17	13	10	8	6	5	4	4	3	3	2	2	2	2	2	lux
58,1	14,5	6,5	3,6	2,3	1,6	1,2	0,9	0,7	0,6	0,5	0,4	0,3	0,3	0,3	0,2	0,2	0,2	0,2	0,1	fc

Intensities in 0° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
625	622	613	599	579	554	524	490	452	411	366	319	271	221	171	123	76	34	5	0	cd
100%	100%	98%	96%	93%	89%	84%	78%	72%	66%	59%	51%	43%	35%	27%	20%	12%	5%	1%	0%	of 0°val

Intensities in 90° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
625	622	613	598	578	554	524	490	452	411	367	320	272	222	173	124	78	35	8	1	cd
100%	99%	98%	96%	92%	89%	84%	78%	72%	66%	59%	51%	43%	36%	28%	20%	12%	6%	1%	0%	of 0°val

Intensities in 180° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
625	622	613	599	579	554	524	490	452	411	366	319	271	221	171	123	76	34	5	0	cd
100%	100%	98%	96%	93%	89%	84%	78%	72%	66%	59%	51%	43%	35%	27%	20%	12%	5%	1%	0%	of 0°val

Intensities in 270° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
625	622	613	598	578	554	524	490	452	411	367	320	272	222	173	124	78	35	8	1	cd
100%	99%	98%	96%	92%	89%	84%	78%	72%	66%	59%	51%	43%	36%	28%	20%	12%	6%	1%	0%	of 0°val

Light Measurement Report

Print date: 10-2-2025

Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS

Measurement tracking No. and Link: [VT250210-007458](#)

Operator:



Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances											
	p Ceiling	70	70	50	50	30	70	70	50	50	30
	p Walls	50	30	50	30	30	50	30	50	30	30
	p Floor	20	20	20	20	20	20	20	20	20	20
Room size		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	20,8	22,0	21,0	22,3	22,5	20,8	22,0	21,0	22,3	22,6
	3H	22,2	23,5	22,6	23,8	24,0	22,2	23,5	22,7	23,8	24,0
	4H	22,8	24,0	23,2	24,3	24,6	22,9	24,1	23,3	24,4	24,6
	6H	23,3	24,4	23,7	24,7	25,1	23,4	24,5	23,7	24,7	25,1
	8H	23,5	24,5	23,8	24,8	25,2	23,5	24,6	23,9	24,9	25,3
	12H	23,5	24,5	23,9	24,9	25,3	23,6	24,6	24,0	25,0	25,4
4H	2H	21,4	22,6	21,8	22,9	23,1	21,4	22,6	21,8	22,9	23,1
	3H	23,1	24,1	23,5	24,5	24,9	23,2	24,2	23,5	24,5	25,0
	4H	23,8	24,7	24,2	25,1	25,7	23,8	24,8	24,3	25,2	25,7
	6H	24,4	25,2	24,9	25,6	26,0	24,4	25,3	24,9	25,7	26,0
	8H	24,5	25,4	25,1	25,7	26,1	24,6	25,4	25,1	25,8	26,2
	12H	24,7	25,3	25,2	25,8	26,2	24,7	25,4	25,2	25,8	26,3
8H	4H	24,1	24,9	24,6	25,3	25,7	24,1	24,9	24,6	25,3	25,7
	6H	24,8	25,4	25,3	25,9	26,4	24,9	25,5	25,4	25,9	26,5
	8H	25,1	25,6	25,6	26,2	26,8	25,1	25,7	25,7	26,2	26,9
	12H	25,3	25,7	25,9	26,2	26,9	25,3	25,8	25,9	26,3	26,9
12H	4H	24,1	24,8	24,6	25,2	25,7	24,1	24,8	24,6	25,2	25,7
	6H	24,9	25,4	25,4	26,0	26,6	24,9	25,5	25,4	26,0	26,6
	8H	25,2	25,6	25,8	26,2	26,8	25,2	25,7	25,8	26,2	26,8
Variations with the observer position for the luminaire spacings, S:											
S = 1.0H				0,1 / -0,1				0,1 / -0,1			
S = 1.5H				0,1 / -0,2				0,1 / -0,2			
S = 2.0H				0,4 / -0,5				0,4 / -0,5			

Coefficients of Utilization

Ceiling reflectance	80			70			50			30			10			0		
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR		(RCR: Room Cavity Ratio)			Room Values are expressed as percentage of Lumen delivered to the task surface													
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	108	104	99	95	106	101	97	94	97	94	91	93	90	88	89	87	85	83
2	99	90	83	77	96	88	82	76	85	79	75	81	77	73	78	74	71	69
3	90	79	71	64	87	77	70	64	74	68	62	72	66	61	69	64	60	58
4	82	70	61	54	80	69	60	54	66	59	53	64	57	52	61	56	52	49
5	75	62	53	47	73	61	53	46	59	52	46	57	51	45	55	49	45	43
6	70	56	47	41	68	55	47	41	53	46	40	52	45	40	50	44	39	37
7	65	51	42	36	63	50	42	36	49	41	36	47	40	35	46	40	35	33
8	60	47	38	32	59	46	38	32	44	37	32	43	36	31	42	36	31	29
9	56	43	34	29	55	42	34	29	41	34	29	40	33	28	39	33	28	26
10	53	39	31	26	51	39	31	26	38	31	26	37	30	26	36	30	26	24

Light Measurement Report

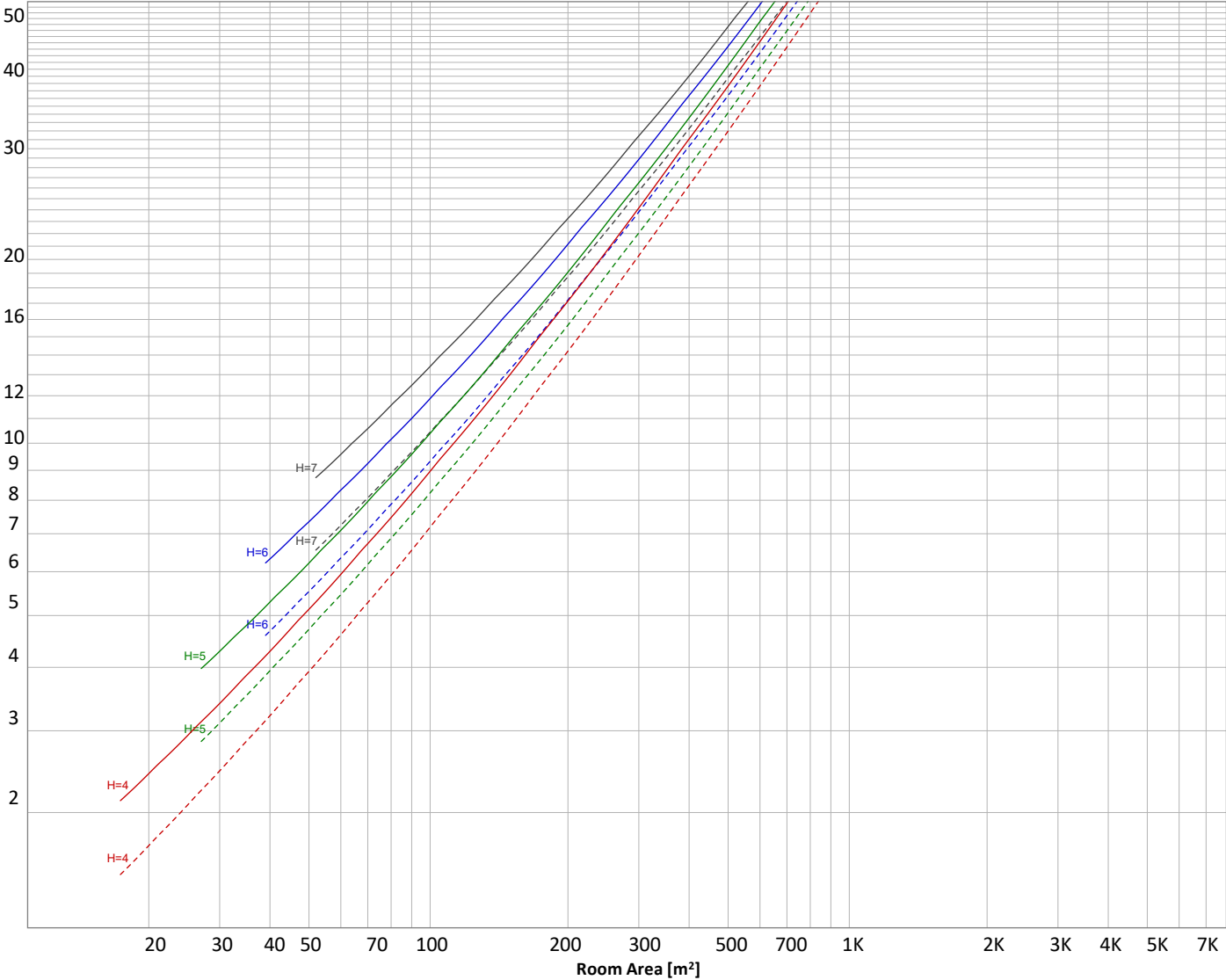
Print date: 10-2-2025
Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS
Measurement tracking No. and Link: [VT250210-007458](#)
Operator:



Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



Conditions

H = Room height	Flux = 1787 lm	p(%)		
H _{down} = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	Wall reflectance
H _{work} = Work area height from floor =	0.00 m	-----	70	50
E _{work} = Average lux on work area =	100 lx	-----	50	30
				Floor reflectance
				20

Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
59,2 lm	169 lm	255 lm	307 lm	317 lm	286 lm	219 lm	130 lm	39,0 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
1,08 lm	0,575 lm	0,681 lm	0,768 lm	0,752 lm	0,703 lm	0,569 lm	0,365 lm	0,133 lm

Light Measurement Report

Print date: 10-2-2025

Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS

Measurement tracking No. and Link: [VT250210-007458](#)

Operator:



Outdoor Light Planning

Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	59 lm	3,3%
10-20°	169 lm	9,5%
20-30°	255 lm	14,3%
30-40°	307 lm	17,2%
40-50°	317 lm	17,7%
50-60°	286 lm	16,0%
60-70°	219 lm	12,3%
70-80°	130 lm	7,3%
80-90°	39 lm	2,2%
90-100°	1 lm	0,1%
100-110°	1 lm	0,0%
110-120°	1 lm	0,0%
120-130°	1 lm	0,0%
130-140°	1 lm	0,0%
140-150°	1 lm	0,0%
150-160°	1 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
Total	1787 lm	100,0%

Intensity peaks

Max intensity	626 cd
Intensity, 90°	5 cd
Intensity, 0°	625 cd

Zonal Lumen summary

Zone (γ)	Lumen	% Total
0-30°	483 lm	27,1%
0-40°	790 lm	44,2%
0-60°	1393 lm	78,0%
60-90°	388 lm	21,7%
70-100°	170 lm	9,5%
90-120°	2 lm	0,1%
0-90°	1781 lm	99,7%
90-180°	6 lm	0,3%
0-180°	1787 lm	100,0%

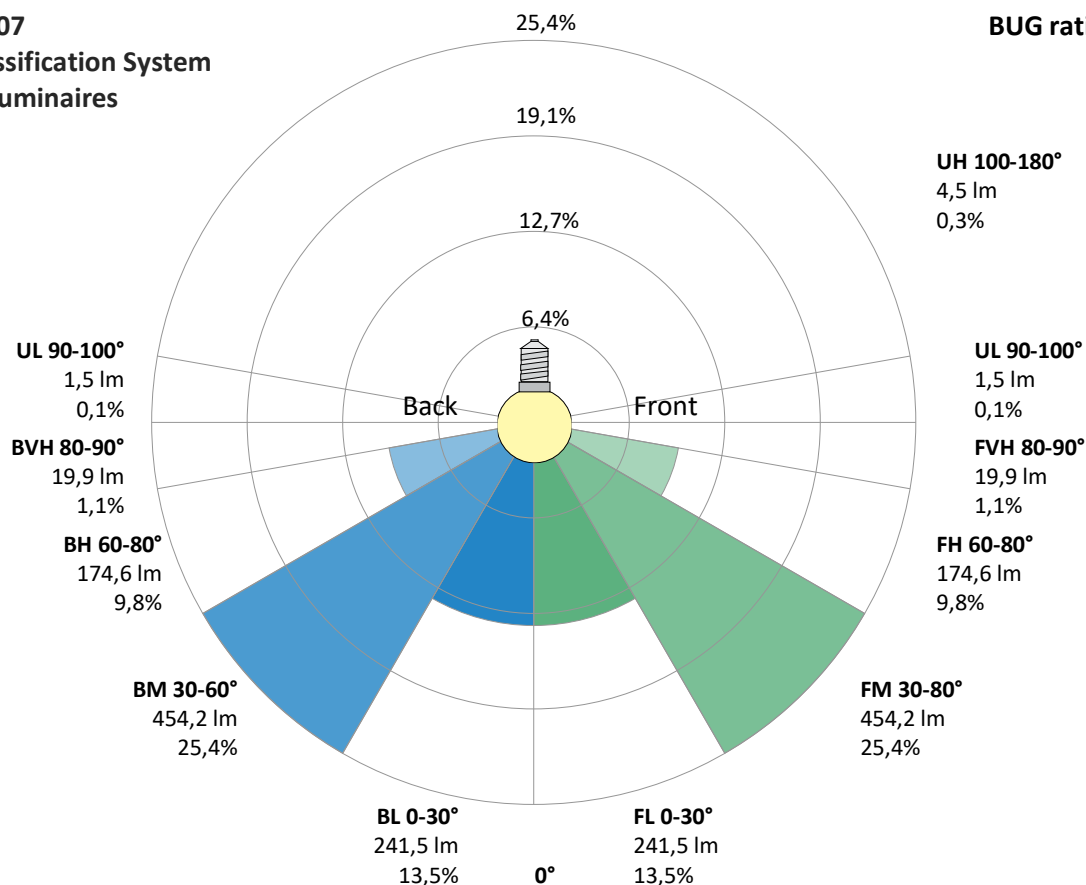
BUG rating

	Lumen	% Total
Forward light		
Low(0-30°)	241 lm	13,5%
Medium(30-60°)	454 lm	25,4%
High(60-80°)	175 lm	9,8%
Very high(80-90°)	20 lm	1,1%
Back light		
Low(0-30°)	241 lm	13,5%
Medium(30-60°)	454 lm	25,4%
High(60-80°)	175 lm	9,8%
Very high(80-90°)	20 lm	1,1%
Uplight		
Low(90-100°)	1 lm	0,1%
High(100-180°)	5 lm	0,3%

IESNA TM-15-07

Luminaire Classification System For Outdoor Luminaires

BUG rating B1 U1 G1



Light Measurement Report

Print date: 10-2-2025
Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS
Measurement tracking No. and Link: [VT250210-007458](#)
Operator:

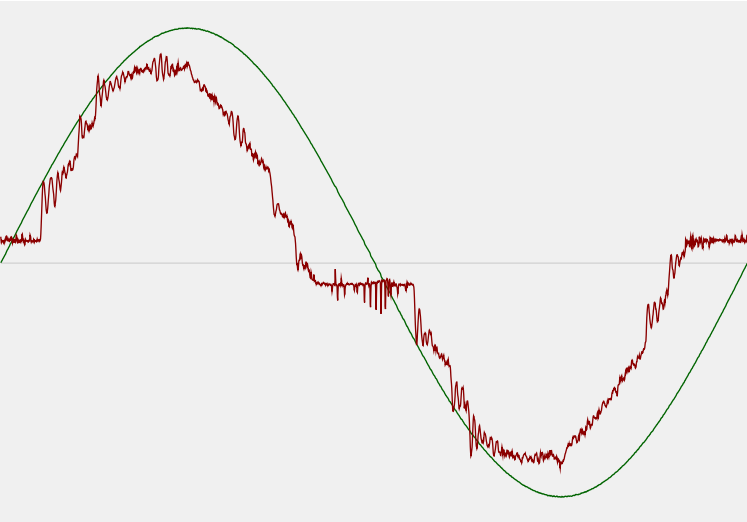


Power Details

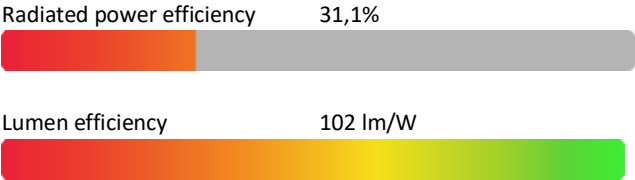
Input Power

Power feed to light source	17,5 W
Frequency of input power	50 Hz
RMS Input voltage feed, V_{RMS}	230 V
RMS Input current feed, I_{RMS}	0,082 A
Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$	18,77 VA
Displacement factor of AC power feed	0,96
Power factor of AC current feed	0,93
Total harmonic distortion of the current	25,76%
Total harmonic distortion of the voltage	0,06%

Input Power Curve



Efficiency



Stabilization Details

Warmup Conditions

Stable period	15 min
Stable change max	2,0%
Minimum time	15 min

Color Temperature Change

CCT start	3999 K
CCT shift	+1 K
CCT end	4000 K

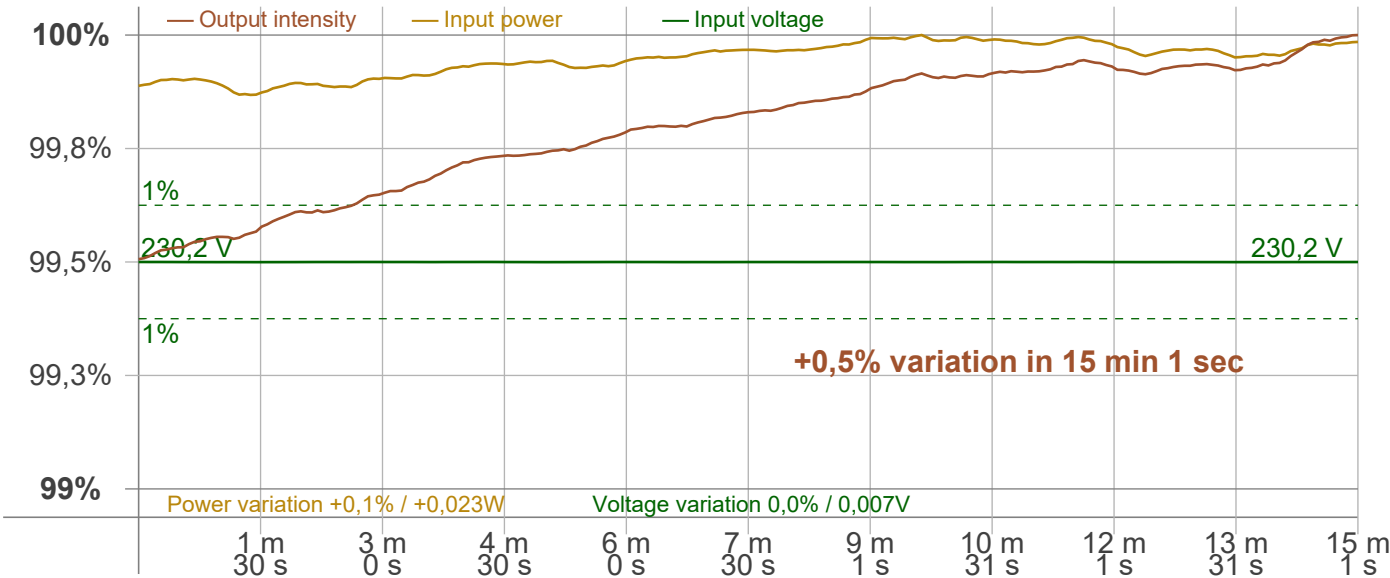
Warmup Result

Total warmup time	Lamp stabilized in 15 min 1 sec
Warmup variation	+0,5%

Output Change

Output start	1778 lm
Output change	+9 lm
Output end	1787 lm

Stabilization Curve



Light Measurement Report

Print date: 10-2-2025

Measurement date and time: 10-2-2025 15:06:31 – Measurement no. VFR-250210-3328-MS

Measurement tracking No. and Link: [VT250210-007458](#)

Operator:



Flicker /TLA details

Flicker Meter Type Viso Systems LabFlicker
Frequency of input power 50 Hz
Flicker/TLA sample rate 20000 samples/s

Measurement time
PstLM 180 sec
All other indices 1,2 sec

Flicker indices according to Illuminating Engineering Society (IES)

Flicker frequency 100 Hz
Percent Flicker 46,99 %
Flicker index 0,15

Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz 0,23 %
JA8/10 90 Hz 0,41 %
JA8/10 200 Hz 46,6 %
JA8/10 400 Hz 46,92 %
JA8/10 1000 Hz 46,97 %

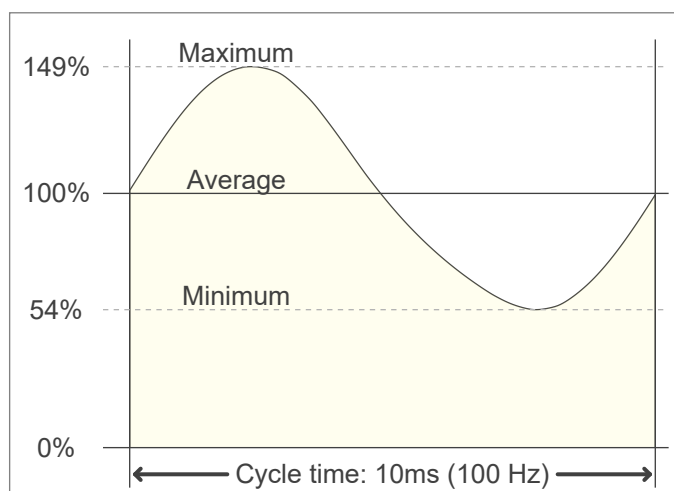
TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value ($F < 80$ Hz) 0,2
SVM value ($80 < F < 2000$ Hz) 1,83

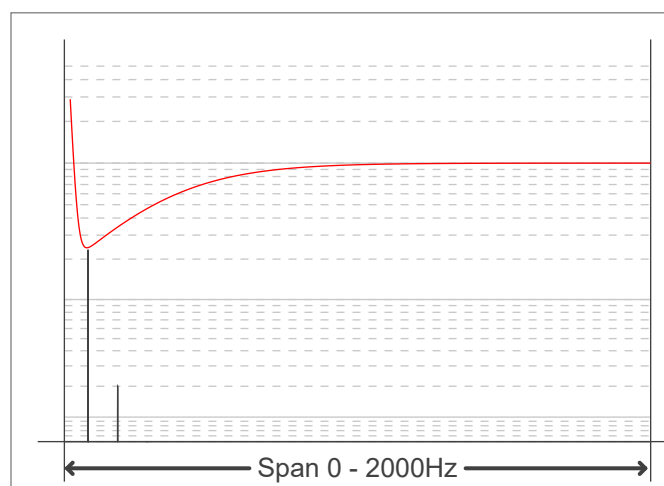
Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0,14

Flicker frame (frame of one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

